

1 an.
Kao Is.
Hawaii

FEB 22 1949

UNIVERSITY OF HAWAII
OCCASIONAL PAPERS

Number 46

Immigrant Plants in the
Hawaiian Islands. II.

F. RAYMOND FOSBERG



PUBLISHED BY THE UNIVERSITY OF HAWAII
HONOLULU, 1948



Digitized by the Internet Archive
in 2016

<https://archive.org/details/immigrantplantsi00fosb>

Immigrant Plants in the Hawaiian Islands. II.¹

F. RAYMOND FOSBERG

The first paper of this series² was published in 1937, after five years of botanical study in the Hawaiian Islands. In 1946 I was able to spend several months on Oahu after an absence of nine years and returned again in 1948. Many striking changes were noticed in the occurrence, distribution, and abundance of the introduced plants, both wild and cultivated. Some of these changes seemed much more obvious as a result of my long absence than they would likely have been to one who had watched them take place. It appears worth while to record such of these changes as are definite or for which the plants have been identified. They are incidents in the history of a flora of which we have all too few definite records. Several plants are here recorded for the first time from the Hawaiian Islands, though this does not necessarily mean that they are recent arrivals. Several of them were known to me ten years ago but definite identifications were not then available. In addition, this paper includes taxonomic notes on certain plants, makes a new combination in *Polyscias*, and calls attention to certain taxonomic conclusions of other workers that apply to Hawaiian introduced plants and which might otherwise take considerable time to find their way into Hawaiian literature.

The genera dealt with are *Azolla*, *Digitaria*, *Paspalum*, *Setaria*, *Trichachne*, *Callisia*, *Zebrina*, *Musa*, *Spathoglottis*, *Batis*, *Spergularia*, *Kalanchoë*, *Rubus*, *Schinus*, *Rhizophora*, *Bruguiera*, *Tibouchina*, *Polyscias*, *Plumbago*, *Catharanthus*, *Thevetia*, *Porana*, *Messerschmidia*, *Asystasia*, *Dicliptera*, *Ruellia*, *Kigelia*, *Tabebuia*, *Ixora*, *Paederia*, *Lonicera*, *Hippobroma*, *Emilia*, *Eupatorium*, *Pluchea*, and *Verbesina*.

SALVINIACEAE

Azolla filiculoides Lam.

Although this plant has decreased greatly since 1937 owing to the destruction of taro patches in Waikiki, Manoa, and other places, it still persists since it was collected in a flourishing condition in 1946 in a pond at Haleiwa, Oahu (Fosberg 27124).

GRAMINEAE

Digitaria henryi Rendle

This was first reported in 1937 by Leo D. Whitney, who recommended it as

¹ University of Hawaii Occasional Paper 46. Issued December 10, 1948.

² University of Hawaii Occasional Paper 32: 1-11, 1937.

a lawn grass. It has since become fairly widespread, as at Nuuanu Pali (Fosberg 27085) where it tends to cover and protects bare ledges and talus slopes.

On Molokai it was reported in 1939 (Whitney, Hosaka, and Ripperton, Hawaii Agr. Exp. Sta. Bull. 82: 54, 1939) to be established on a small area on Maunaloa. In 1948 it was found to be common on the rocks and sand between Kaeo and Kawaihau (Fosberg 29592) on the northwest corner of the island.

Paspalum urvillei Steud.

This large, erect *Paspalum* with fuzzy spikelets and long-hispid lower sheaths is well established in Nuuanu Valley, at least from the Reservoir down to School Street, Honolulu, where it was collected in 1946 growing in a crevice in the cement-lined stream bed (Fosberg 27093).

Setaria palmifolia (Willd.) Stapf

Chaetochloa palmifolia (Willd.) Hitchc. and Chase

A coarse grass with large, strongly plicate leaves, spreading by deeply buried rhizomes. Once established, it can only with great difficulty be eradicated. It was reported in 1922 by Hitchcock who collected it on Mount Tantalus and in upper Manoa Valley, as well as on the island of Hawaii. In the 1930's a thriving colony was known to me on the south end of the Manoa Cliff Trail on Oahu. In 1948 this locality was revisited and this plant was found to have spread and become the dominant herbaceous plant along the entire trail (Fosberg 29481). It was also abundant on Mount Tantalus above the trail, and Dr. H. St. John reports it as established in Palolo Valley. It forms dense masses, excluding other plants, and is troublesome to walk through. Already this has become a serious weed problem locally, and will probably continue to become worse, if not checked.

Trichachne insularis (L.) Nees

This most aggressive weed, locally called sour grass, has increased notably during the last ten years. In the 1930's it was well established in the Manoa region and was becoming common enough in southeastern Oahu and elsewhere to cause alarm among stockmen, as it is quite unpalatable to livestock. It has abundantly justified their fears as it is now a pest in all parts of Oahu except the rain-forest and cloud-forest areas in the higher mountains. Oahu has also become a point of dispersal for this species to other parts of the Pacific. It has recently appeared on Eniwetok, Bikini, and Kwajalein atolls in the Marshall Islands and on Tinian Island in the Marianas, around depots of military equipment presumably transported from Oahu.

Hosaka (Noxious Weeds of Hawaii, 1945) has briefly noted its spread in the Hawaiian Islands.

COMMELINACEAE

Callisia fragrans (Lindl.) Woodson, Ann. Mo. Bot. Gard. 29: 155, 1942.

Spironema fragrans Lindl., in Edwards' Bot. Reg. n.s. 3: pl. 47, misc. 26, 1840.

Rectanthera fragrans Degener, Fl. Haw. 62: R F, 6/30/'32.

Woodson has pointed out that the principal difference between this plant and the genus *Callisia* is in size, which scarcely seems sufficient. It is occasionally cultivated in Hawaii, being commonly called tradescantia, and has established itself on the slopes of Punchbowl, Honolulu (*Fosberg* 27144), where a flourishing colony was observed where garden-rubbish has been dumped. It has also been noted in other spots, for example, on the east side of the mouth of Palolo Valley (*Fosberg* 29645), where it is abundant, well established, and thoroughly naturalized.

Zebrina pendula Schnizl.

A fair-sized colony of this common cultivated plant was observed to be well established wild on the slopes of Punchbowl (*Fosberg* 27146), also around a garden-rubbish dump in a thick stand of *Leucaena glauca*.

MUSACEAE

Musa nana Lour., Fl. Coch. 644, 1790.

This name should replace *Musa cavendishii* Lamb. as pointed out by E. D. Merrill (Trans. Am. Phil. Soc. n.s. 24: 115, 1935) for the banana of very low stature, in Hawaii commonly called Chinese banana. I see no reason to accept, at least without much further demonstration, the suggestion there made, and becoming current in tropical agricultural circles, that this should be regarded as a variety of *M. sapientum*.

ORCHIDACEAE

Spathoglottis plicata Bl.

The pink-purple form of this species has been extremely successful in the Koolau region of Oahu. It is now much more common than in 1937 along the Nuuanu Pali Road and throughout upper Nuuanu Valley (*Fosberg* 27087), as well as in Manoa and Waikane Valleys, and on Kapalama Heights. Seedlings appear as weeds in seedbeds of other species of cultivated orchids, as well as around nurseries and greenhouses. It has been said (Degener, Fl. Haw. 80: S P, 7/30/'32) that it was first introduced about 1930 into the wet forests of Oahu with nursery stock used in reforestation.

Dr. H. St. John has recorded it from numerous localities on all parts of Oahu as well as on Molokai, Kauai, Maui, and Hawaii. So widespread are the localities on Oahu that it is probable that it has reached all except the really arid parts of the island, where it would not be likely to become established. Its dust-like seeds are freely blown about by the wind and this would ensure its reaching every available habitat within a short time.

BATIDACEAE

Batis maritima L.

This was first reported by Hillebrand from the vicinity of Honolulu, discovered in 1859. Degener (Fl. Haw. 91: B M, 4/4/'33) reports it as having spread to all salt marshes on Oahu as well as on Niihau, Maui, and Molokai. Since 1937 there has been some increase in its area through its spread into less ideal habitats in stream mouths and depressions back of beaches. There are vast flats of it on the south coast of Molokai, especially in the vicinity of Kaunakakai. On Oahu it is very common from Maunalua Fish Pond to Pearl Harbor; on the Waianae side, at Lualualei, Waianae, Makaha, and Keeau, in and around the mouths of streams; and on the windward side at Waialua, Heeia, Kaneohe Bay, and Kailua. At Barbers Point it covers perfectly dry areas back of the ridge of beach sand.

J. C. Th. Uphof, in an article and map entitled "Die geographische Verbreitung der Familie der Batidaceae," (Die Pflanzenareale III, 2: Karte 11, 1931) includes the Hawaiian Islands in the known range of this species, without indication that it is a recent introduction. To avoid erroneous conclusions as to the derivation of the Hawaiian flora, attention should be directed to the fact that it is not a member of the indigenous flora. On the map an uncertain range is indicated in central and southern Polynesia by a broken line surrounding all of the islands from the Palmyra-Christmas group of the Line Islands southward, and from just west of Long. 165° W. eastward to Easter Island and Sala y Gomez. To the best of my knowledge *Batis* does not exist in Polynesia, except in the Hawaiian Islands, even as an introduction, nor are there any specimens except from there in the extensive Polynesian collections of the B. P. Bishop Museum, Honolulu. It is quite possible that the form of *Sesuvium portulacastrum* from southern and central Polynesia, a variant with almost terete erect leaves and lacking red coloring, may have been misdetermined as *Batis*.

CARYOPHYLLACEAE

Spergularia marina (L.) Griseb., Spicil. Fl. Rumel. et Bith. 1: 213, 1843.

Arenaria rubra β *marina* L., Sp. Pl. 1: 423, 1753.

Alsine marina All., Fl. Pedem. 2: 114, 1785.

Spergularia salina Presl., Fl. Cech. 95, 1819.

In the first paper of this series (University of Hawaii Occasional Paper 32: 5, 1937) I accepted the name *S. salina* for this species. Dr. Rossbach, in her excellent monograph on the American species of this genus (*Rhodora* 42: 57-83, 105-143, 158-193, 203-213, 1940), shows by her synonymy (pp. 123-127) and her discussion (p. 136) that the first use of the epithet *marina* in the specific rank is that of Allioni in 1785, giving it many years of priority over *salina*. And if for any reason Allioni's publication should not be accepted, its use by Smith (1800 and again in 1802) and by Haworth (1812) still gives it priority over *S. salina* Presl.

This plant has spread widely in the drier lowlands in recent years. It behaves as an ephemeral annual, springing up in dry coral sand after rains.

CRASSULACEAE

Kalanchoë verticillata Elliot

Degener (Fl. Haw. 153: K T, March 15, 1940) refers this to *K. tubiflora* (Harv.) Hamet, and says it was introduced before 1930. I have known it since about 1935 as a cultivated plant. Baldwin, in his treatment of the genus (Am. Jour. Bot. 25: 573, 576, 1938) treats this, the Madagascar plant, as a separate species from the African *K. tubiflora*. It has become established around a garden-rubbish dump on the slopes of Punchbowl, Oahu (Fosberg 27145). It is to be hoped that it does not make itself as much at home as the related and similarly vegetatively multiplying *Bryophyllum pinnatum*, which is now the dominant weed in many places on Oahu.

ROSACEAE

Rubus rosaefolius Smith

The thimble-berry was introduced in the 1880's on the island of Hawaii and did not appear on Oahu till 1916. By the early 1930's it was common in many wet regions on Oahu. Degener (Fl. Haw. 167: R R 1/15/'36) gives an account of its spread in the islands. It was found sparingly along the Waikane-Schofield Trail around the head of Kahana Valley, Oahu, in the 1930's. Now it is so abundant that it is a continual obstruction to progress along the trail almost to the top on the Kahana side (Fosberg 27159). It seems very well adapted to the wet, open environment of these steep valley heads.

ANACARDIACEAE

Schinus terebinthifolius Raddi

The "Christmas berry" or "Hawaiian holly" was fairly common generally in the lowlands in the 1930's. Now it is an important component of practically all lowland brushy vegetation on Oahu outside the solid *Prosopis* or kiawe forest. Kailua Beach, Oahu (Fosberg 27080).

RHIZOPHORACEAE

Rhizophora mangle L.

The common American mangrove was introduced first on Molokai in 1902, then again twenty years later at Heeia, Oahu. Of course it soon began to spread to suitable habitats elsewhere. In the 1930's it had begun to appear at Maunaloa, Kailua, and Kaneohe, and had established great swamps at Kalihi Kai. A brief survey in 1946 shows it established at Ala Moana Park, Honolulu (Fosberg 27164),

Kalihi Kai (*Fosberg* 27109), Niu Stream Estuary (*Fosberg* 27117), Kailua Stream Estuary (*Fosberg* 27158), Kaneohe Bay, Kahaluu Fish Pond, Hauula, Laie, and at various places around the heads of all three lochs at Pearl Harbor, in addition to the original locality in Heeia Bridge (*Fosberg* 27123).

At Heeia it has grown up into a dense, swampy forest up to 10 m. or more tall. It is not so abundant in Pearl Harbor as I had expected it would become, but is well established around the heads of all three lochs. The Kalihi Kai occurrence is now much more restricted than in 1937, due to the extensive dredging and construction operations that have been carried on in that area. The stands there at present are all rather young. The occurrence at Kuapa Fish Pond, Maunaloa, observed in 1937, has been completely eliminated. On Molokai it now forms great swamps.

Fish pond operators consider mangroves a pest as they tend to choke up the ponds, finding in their quiet shallow water an ideal habitat.

In the Philippines the mangrove swamps are an economic asset, yielding timber, charcoal, and tanbark. There is no reason why they should not yield these products in Hawaii, but whether they could be worked profitably is questionable.

Bruguiera conjugata (L.) Merr.

This mangrove was introduced from the Philippines and planted at Heeia Bridge, Oahu, in 1922. Degener reported it in his *Flora Hawaiiensis* in 1934 as *B. sexangula*. The latter species is characterized by having yellow calyces with ten lobes. *B. conjugata* has red calyces with usually twelve or thirteen lobes. The plant established at Heeia Bridge (*Fosberg* 27122, 27134) has red flowers and is undoubtedly *B. conjugata* in spite of occasionally having mostly ten-lobed calyces (27122). The calyces of No. 27134 have from ten to thirteen lobes.

Judging by the vigorous appearance of the trees at Heeia and the dense stands of healthy seedlings in their immediate vicinity, this species must be well adapted to its Hawaiian environment. However, in striking contrast to its neighbor, *Rhizophora mangle*, propagated very similarly, it has not spread beyond the Heeia swamp and not widely there. It tends, for one thing, to compete better on the upstream side of the swamp where the salinity is lower. This is in accord with observations in Micronesia, where the species is native. In Hawaii it seems to be much less able to scatter its seedlings to a distance from the parent trees, though very well able to hold its own locally.

MELASTOMACEAE

Tibouchina semidecandra (Sch. and Mart.) Cogn.

This serious weed of the wet forests, known for some years as a pest around Kilauea, on the island of Hawaii, may now be reported as well established in upper Nuuanu Valley, Oahu (*Fosberg* 27607). It may still be eradicated here at a relatively small cost. Rather than to have still another insoluble weed problem, it would seem obviously worth while to do this while it is still possible.

ARALIACEAE

Polyscias scutellaria (Burm.) Fosberg, n. comb.

Scutellaria prima Rumph., Herb. Amb. 4: 75, pl. 30, 1743.

Crassula (scutellaria) Burm., Fl. Ind. 78, 1768.

Nothopanax cochleatum Miq., Fl. Ind. Bat. 1(1): 766, 1855.

Examination of the Rumphian plate 30, the basis for Burmann's *Crassula scutellaria*, shows that it represents the plant commonly known as *Nothopanax cochleatum*, the hedge panax with unifoliolate leaves, rather uncommonly cultivated in Honolulu. It is the form with short, upright or spreading leaves with strongly concave blades, not common in Hawaii but often planted on the islands farther west in the Pacific. A specimen cultivated in Makiki (Fosberg 29536) represents this form. Further study will probably show that these forms deserve some sort of nomenclatural recognition.

The generic name *Nothopanax*, based on this species, has been upheld in its application to the unifoliolate and palmate-leaved species of this alliance, leaving the pinnately compound-leaved species in *Polyscias*. This was done by Sprague and Greene (Kew Bull. [1933]: 154-155, 1933) and approved with some hesitation by Bailey (Gentes Herb. 1: 135, 1923, and Man. Cult. Pl. 557, 1924) apparently on the assumption that the unifoliolate species were derived from the palmately compound ones. This may well be true of the New Zealand species. However, that the present plant (type of *Nothopanax*) is positively related to the pinnately compound ones, is shown by the occasional pinnate leaves and leaves with an extra articulation in the petiole found on plants of the large-leaved form of this species, such as Fosberg 29473, from Honolulu, which shows a complete transition of leaf types; those growing in the grounds of Iolani Palace, Honolulu, (Fosberg 29490); a specimen in the Bishop Museum collected on Ualakaa Street, Honolulu, by Gerrit P. Wilder in 1934; and two sheets from the campus of the University of Hawaii, Honolulu (St. John 13193). The other form (Fosberg 29536), the typical smaller-leaved one, shows no pinnate leaves but the petioles have either one or two articulations, both conditions existing on the same plant. Therefore the plant is here referred to *Polyscias* Forst., the oldest available generic name for the genus with pinnate leaves, taking the name *Nothopanax* Miq. with it into synonymy under *Polyscias*. Another name will have to be found for the New Zealand species, if they are really generically distinct.

PLUMBAGINACEAE

Plumbago auriculata Lam.

P. capensis Thunb.

A single healthy shrub of this species was found growing wild near a garden-rubbish dump in a thick stand of *Leucaena glauca* on the slopes of Punchbowl, Honolulu (Fosberg 27147).

APOCYNACEAE

Catharanthus roseus (L.) Don

Vinca rosea L.

Lochnera rosea (L.) Reichenb.

This common ornamental was observed to be naturalized along roadsides at Kailua, Oahu. The name *Catharanthus* is correct for it if *Vinca* is divided, since *Lochnera* Don is to be considered an orthographic variant and thus a later homonym of *Lochnera* Scop., as indicated in the synonymy by Degener (Fl. Haw. 305: C R 6/14/'33).

Thevetia thevetioides (H.B.K.) Schum., in Engl. u. Pr. Nat. Pfl. 4(2): 159. 1895.

Cerbera thevetioides H.B.K., Nov. Gen. et Sp. 3: 223, 1819.

Thevetia yccotli A. DC., Prodr. 8: 343, 1844.

Woodson (N. Am. Fl. 29: 135, 1938) has pointed out that the name *Thevetia yccotli* is thus antedated for the salmon-flowered "be-still tree" that is occasionally cultivated in Hawaii.

CONVOLVULACEAE

Porana paniculata Roxb.

In the 1930's this ornamental vine was rare. I knew it from the Queen's Hospital grounds only. Now it is commonly seen cultivated throughout the city, especially near the foot of the mountains. Makiki, Honolulu (*Fosberg* 27156).

BORAGINACEAE

Messerschmidia argentea (L.) Johnst.

Tournefortia argentea L.

The history of this plant in cultivation in the Hawaiian Islands goes back a long time. There are specimens in the Bishop Museum from as far back as the time of Mann and Brigham in 1864-65, and from several subsequent collections made on Oahu and Kauai. Hillebrand reported it as in cultivation. Otto Degener informs me that as late as his first years in the islands (in the 1920's) there was a large tree near the Aquarium at Waikiki Beach. It is not there now. Judging by the rarity or absence of large old trees in recent years it is obvious that the species did not become well established either as a cultivated or a naturalized tree during its first sixty-five years in the islands. It has, however, in recent years become quite at home here.

I first observed it on Maui in 1933 (*Fosberg* 9832), where it seemed well established and was reproducing itself along the coast northwest of Kahului. In 1936 it was growing at Mokuleia, Oahu, on the property of Otto Degener, who

got the plants from the Hawaiian Sugar Planters' Association Nursery. These plants were later killed by pigeons which devoured the succulent leaves. Also in 1936 it was found planted at Kailua Beach, Oahu (*Fosberg* 13291). In 1937 it was collected on Kapapa Islet, Kaneohe Bay, Oahu (*Fosberg and Egler* 14036). According to the reports of the Board of Commissioners of Agriculture and Forestry for the periods ending December 31, 1936 (p. 30) and December 31, 1938 (p. 53), ten plants were planted on government lands in 1935 and 1936, and sixty plants in 1937 and 1938.

In 1943 it was collected at Keauhou, Hawaii (*Fagerlund and Mitchell* 385). Now it is growing around John Rodgers Airfield (Honolulu Airport), Kalihi Kai, where it is reported by Donald Anderson to have been planted by the naval authorities; at Iwilei, Honolulu (*Fosberg* 27148); and is becoming common at Kailua Beach and Lanikai. There is a thriving colony at Kaunakakai, Molokai (*Wentworth* in 1947), and large, planted specimens were observed near Kamalo in 1948.

It seems to do well in more or less saline places, as would be expected from its native habitat on coral atolls and beaches across the Pacific and Indian Oceans. Hawaii was one of the few island groups in the tropical Pacific that it had not reached before the advent of Europeans. Here it is usually found planted, but is able to reproduce itself under favorable conditions.

ACANTHACEAE

Asystasia gangetica (L.) T. Anders.

This common ornamental has escaped and spread widely in the lowlands. In 1937 it was well established in vacant lots near the University of Hawaii campus in Manoa Valley, Honolulu. Now it grows along the roadsides at Niu, Oahu (*Fosberg* 27119), Makapuu (*Fosberg* 29683), at Kailua, and many other localities. Both the purple- and the white-flowered forms are established, as well as a curious yellow-flowered one (*Fosberg* 29835) collected at the Bishop Museum grounds. It is a common weed of vacant lots and roadsides in Honolulu.

Dicliptera chinensis Juss.

In 1935 I collected this species along Nuuanu Stream at Waikahalulu Falls, Oahu (*Fosberg* 12319), and in 1936 along Manoa Stream near the University Farm (*Fosberg* 13319). By 1946-48 it had become much more abundant in both localities (*Fosberg* 27092, 29649) and in Manoa it is appearing in gardens as a weed. E. C. Leonard kindly made the determinations of this and the following species for me.

Ruellia brittoniana Leonard, Jour. Wash. Acad. 31: 96, 1941.

Cryphiacanthus angustifolius Nees, in DC. Prodr. 11: 199, 1847; not *Ruellia angustifolia* Sw. 1788.

Ruellia spectabilis Britt., Ann. N. Y. Acad. 7: 192, 1893; not Nichols 1886.

This widespread, weedy species was collected in the bed of Nuuanu Stream,

just below School Street, Honolulu (Fosberg 27098). It is an herb up to 0.5 m. tall, with large blue-violet flowers.

BIGNONIACEAE

Kigelia pinnata DC.

In the 1930's I knew of only three specimens of the sausage tree in Honolulu: one at the University, another at Fernhurst, the other in the Foster Gardens (Rock 2156, 2636). Now it is seen fairly commonly. It is planted as a street tree in Ala Moana Park and as a garden tree occasionally elsewhere.

There has been some confusion as to the identity of the species of sausage tree that is widespread in cultivation. The following key, extracted from that given by Sprague in Thistleton-Dyer, *Flora of Tropical Africa* 4(2): 534, 1906, separates the species concerned:

Leaves opposite	<i>K. africana</i> (Lam.) Benth.
Leaves ternate.	
Cylindric portion of the corolla tube shorter than calyx	<i>K. pinnata</i> DC.
Cylindric portion of corolla tube much longer than calyx	<i>K. aethiopica</i> Decne.

The plant cultivated in Hawaii has the cylindric portion of the corolla tube about equalling the calyx and probably belongs in *K. pinnata*. The tree on the University campus has a somewhat longer cylindric portion to the corolla tube than that in Foster Gardens. This suggests that two clones are represented, doubtless going back to separate introductions. The two appear to be conspecific.

Tabebuia pentaphylla (L.) Hemsl.

This pink-purple flowered species has become much more common during the last ten years, but still is only occasionally planted. It is an attractive street tree and deserves wider use. Ala Moana Park, Honolulu (V. O. Fosberg 140), Manoa (Fosberg 27157).

RUBIACEAE

Ixora carolinensis Hosokawa, Tr. Nat. Hist. Soc. Form. 25: 268, 1935.

The plant commonly known in cultivation as *Ixora macrothyrsa* Teysm. and Binn. does not run very well to this Malayan species in Bremekamp's key to the genus in the Malay region (Bull. Jard. Bot. Buit. III, 14: 197-367, 1936-37). This fact was noted when I tried to use the key some years ago, but was attributed to inadequacy of the key. At about the same time I noted a strong similarity between cultivated Pacific island plants and the Micronesian *I. carolinensis*. In 1946, while in the Caroline Islands, I was more strongly impressed by this similarity, and the impression was confirmed by Dr. Harold St. John.

The solution seems to be that the cultivated plant actually is *I. carolinensis* and

has nothing to do with *I. macrothyrsa*. J. D. Hooker (Curtis Bot. Mag. 112: pl. 6853, 1886) discussed the species as *I. macrothyrsa*, but illustrated it with a picture of a plant brought from "Ualan or Strong Island, one of the Caroline Group" [= Kusaie]. This plate very obviously represents a well-developed and full-flowered specimen of *I. carolinensis*. It seems clear that the popular cultivated plant is really *I. carolinensis* and that the confusion started when Hooker wrongly referred the original plant cultivated in Kew to *I. macrothyrsa*. This is not the place to consider the actual status of the latter name. It will suffice to say that henceforth the common scarlet-flowered *Ixora* with large clusters of flowers, cultivated in many tropical countries including Hawaii, should be referred to *I. carolinensis*.

The varieties that I recognized for this species (Bishop Museum Occasional Papers 13: 245-293, 1937) seem to have no validity when studied in the field.

Paederia foetida L.

In 1937, though this vine was very abundant in the leeward gulches from Kalihi to Halawa, Oahu, it was not very common elsewhere. It was occasional in Nuuanu and Manoa. On the Nuuanu Pali it had been noted, but was rare. Now it is not only abundant in Nuuanu Valley (Fosberg 27090) but has become abundant on the Pali and is common along the roadside fences down to Kailua itself (Fosberg 27078) at just above sea level in relatively dry land away from the forest. It is one of the most serious of forest weeds and is quite capable of smothering out large trees.

CAPRIFOLIACEAE

Lonicera japonica Thunb.

In 1937 this was rarely planted. The only place where I had seen it on Oahu was along University Avenue in Honolulu. Now it is fairly frequent. It has been planted, for example, along the levee of the Nuuanu Valley Reservoir (Fosberg 27091), and is to be seen in various sections of Honolulu. The form with purple leaf veins and with flowers pink-purplish outside is the one grown in the islands.

CAMPANULACEAE

Hippobroma longiflora (L.) G. Don, Gen. Syst. 3: 717, 1834.

Lobelia longiflora L., Sp. Pl. 930, 1753.

Isotoma longiflora (L.) Presl., Prod. Mon. Lob. 42, 1834.

McVaugh (Bull. Torr. Cl. 67: 782-4, 1940) has shown that this common pantropic poisonous weed has little relationship with *Isotoma* but should really be referred to the monotypic genus *Hippobroma* G. Don. Its original home is considered by him to be in the West Indies.

COMPOSITAE

Emilia DC.

Although the widespread, weedy species of this genus are easily told apart when growing, the differences become somewhat obscured in dried specimens. The result is that the material in most herbaria is in a state of utter confusion. Consequently, the treatments in certain modern floras are not very satisfactory. In Hawaii there are four perfectly clear species. Two of these have been known in the islands for some time, but under erroneous names. In 1932, St. John and Hosaka, in their "Weeds of the Pineapple Fields of the Hawaiian Islands," first distinguished three species. Unfortunately, they continued some of the confusion in the nomenclature. The correct names seem to be as follows:

Emilia coccinea (Sims) Sweet, Hort. Brit. ed. III, 382, 1839.

Cacalia coccinea Sims, Bot. Mag. 16: pl. 564, 1803.

Emilia flammea Cass., Dict. Sci. Nat. 14: 406, 1819.

This is the relatively rare plant with the involucre practically as broad as high, with orange-red flowers greatly exceeding the involucre. It is known from Maui, Lanai, and Oahu, but is common chiefly on Lanai.

Emilia sonchifolia (L.) DC., Prodr. 6: 302, 1837.

Cacalia sonchifolia L., Sp. Pl. 835, 1753.

Although this name has frequently been applied, as by St. John and Hosaka, and more recently by Merrill and Perry (Jour. Arn. Arb. 27: 323-325, 1946), to the common red-flowered plant discussed below, all the early references, including the original one by Linnaeus, call for a purple-flowered plant. Early specimens thus named seem usually to be the plant with small heads of purple flowers subequal with the involucre called by St. John and Hosaka "*Emilia* No. 3." Dr. S. F. Blake some years ago in conversation confirmed my opinion that this is the original *E. sonchifolia*.³

Emilia javanica (Burm.) Rob., Phil. Jour. Sci. Bot. 3: 217, 1908.

Hieracium javanicum Burm., Fl. Ind. 174, T. 57, f. 1, 1768.

Cacalia sagittata Vahl, Symb. 3: 91, 1794.

Prenanthes javanica Willd., Sp. Pl. 3: 1534, 1804.

Emilia sagittata (Vahl) DC., Prodr. 6: 302, 1837.

Robinson, in applying Burmann's name, included in this species practically all widespread plants of this affinity with red flowers. Of these, *E. coccinea* is very distinct. Vahl included *Hieracium javanicum* Burm. in his *Cacalia sagittata* and says his specimen does not differ from Burmann's plate except for not having the quadriflorous peduncle. Examination of Burmann's plate shows a plant that matches very well the upper part of vigorous specimens of the red-flowered plant found in

³After this paper was written I had an opportunity to visit the Linnaean Herbarium in London. Examination of the specimen labeled, in Linnaeus' own hand, *Cacalia sonchifolia* confirms my interpretation as it is certainly the delicate purple-flowered plant with flowers subequal with the involucre.

Hawaii. The lower parts are lacking and there are no detailed drawings of the heads. The text, unfortunately, includes "*Sonchus flore purpureo in Java inventus*," which suggests confusion even in the original treatment. However, the rest of the text seems to apply to the red-flowered species, which is certainly the one illustrated in his plate. Garabedian in her rather synoptical treatment (Kew Bull. [1924]: 137-144, 1924) does not adequately clarify this situation. Material cited by her that I have been able to see all belongs to a form with rather firm, less-than-usually-denticulate leaves, possibly closer to *E. prenanthoidea* DC.; it is certainly not the plant illustrated by Burmann. It seems safest to apply to our common plant the name *Emilia javanica*. It may be distinguished by its red, orange, or magenta flowers, only somewhat exceeding the cylindrical involucre which is much higher than broad.

Attention has been called to the variation in color observed in this species. Two types of variation occur in the Hawaiian plants. The common, widespread form of the plant has flowers that, at anthesis, are a rather weak brick-red, though the heads look almost orange because of the orange-red anthers and orange pollen. Growing occasionally with this form, as on the island of Molokai (Fosberg 29599 magenta, Fosberg 29588, 29545, 29613 red) and on Oahu at Wahiawa, according to M. B. Linford, as well as in many other places, is a form whose flowers are a magenta-crimson, described as "mallow-purple" by Linford. It is not certain that the Wahiawa form is the same, as I have not seen it. An orange-red form was collected at Kailua, Oahu (Fosberg 29723), growing in company with magenta (Fosberg 29721) and red (Fosberg 29722) forms. The plants are otherwise identical. In the red form a distinct variation is seen in heads of different ages. The buds just before opening are a rich, deep red. When the flowers are fully open the color is a rather pale brick-red. After they have closed again they are a dull magenta above and a pinkish straw color below. It is possible that observation of old plants or of the magenta form may have given rise to the statement in the Burmann text "*Sonchus flore purpureo*."

It may also be questioned whether Linnaeus may not have had a magenta-flowered plant of this species in mind when he described *Cacalia sonchifolia*. The fact that all subsequent systematic accounts and the older floristic references where such things are noted call for a plant with flowers subequal with the involucre, supports the probability that the confusion with *E. javanica* was introduced into the situation in relatively recent times.⁴

Emilia sp.

Another plant that has been known from the island of Kauai since 1931, but not identified, runs to *E. pinnatifida* Merr. in Garabedian's key and checks fairly well with Merrill's original description, though there are some discrepancies. Comparison with Merrill's type (Merrill 4664 Kew, U. S. Nat. Herb.), however, shows that there is no close resemblance.

It is a large, deep-green, much-branched plant, somewhat arachnoid pilose on its young parts, with notably lyrate or runcinate-lobed leaves with a large terminal segment, with heads almost exactly as in *E. javanica* except that they are a lavender

⁴ See footnote on page 14.

or purple (originally described as pink) and have shorter flowers. The flowers exceed the involucre and the whole head is from 10 to 15 mm. long. Even fragments can readily be distinguished as the uppermost cauline leaves or bracts are lacinate-sagittate.

Material to be referred here was collected on Kauai, without locality in 1931 by E. Y. Hosaka, and at Puhi, on the same island, in 1935 by M. B. Linford, and is preserved in the Bishop Museum.

Dr. Linford has kindly secured living specimens from Kauai and maintained them in cultivation for my study. Specimens of these have been preserved (*Fosberg* 29900). The distinction from the other three species is abundantly borne out by this living material.

I can find no evidence, either in the literature or in any of the herbaria I have consulted, that this plant has received a name. It seems to resemble most closely a giant form of *E. sonchifolia* but with somewhat longer flowers than would be expected in that species. Some material from various parts of the Pacific area (especially that from southeastern Polynesia) referred to *E. sonchifolia* closely resembles this; but in no case were the uppermost cauline leaves or bracts so lacerate. It is quite conceivable that we are dealing with a polyploid form of *E. sonchifolia*, and it seems best to wait until some cytological evidence on this point is available before giving the plant nomenclatural recognition.

Eupatorium adenophorum Spreng.

As predicted in 1936, the pamakani has taken over much territory on Oahu. The vertical gulches of the Nuuanu Pali are filled with it, and, according to Dr. H. St. John, large areas in Manoa and in the Waianae Mountains are dominated by it. It is to be hoped that the gall fly *Procecidochares utilis* Stone, introduced by Mr. Noel Krauss for the Territorial Board of Commissioners of Agriculture and Forestry, will control it. The plants in Manoa and the southern Waianae Mountains were noticeably galled in 1948.

The recent tendency to use the name *E. glandulosum* HBK. for this species has no justification, as I clearly showed in 1937 (University of Hawaii Occasional Papers 32: 9, 1937) that it is a later homonym of *E. glandulosum* Michx.

Eupatorium riparium Regel

In the 1930's this was known to me only from the island of Hawaii. Degener in 1938 suggested that it be eradicated without delay. Of course it was not eradicated. In 1948 it was observed to be very abundant along the headward end of the Manoa Cliff Trail on Oahu, at about 600 m. altitude in moist open forest (*Fosberg* 29478), forming dense stands competing successfully with *E. adenophorum* and with other introduced and native shrubs and grasses. Dr. St. John tells me that it is also very abundant on the ridges from Halawa to Moanalua in the Koolaus. In 1945 Otto Swezey collected a specimen on the Tantalus Road (Bishop Museum).

Pluchea indica Less.

Formerly common only from Honolulu to Pearl Harbor, this shrub is now established at Haleiwa (*Fosberg* 27130), Heeia Bridge (*Fosberg* 27133), Kailua

Beach (Fosberg 27081), Niu (Fosberg 27118), and between Makua Valley and Kaena Point (seen but not collected). It seems to be confined to low-lying coral sand, filled land, and rubble usually just back of the seashore.
Pluchea odorata (L.) Cass.

This weed, as predicted in 1937, has made itself very much at home in Hawaii. It has not yet become abundant in the upper rainy regions, but from Waikiki to the Ewa Coral Plain and Barbers Point (Fosberg 29520) it is one of the commonest plants. In extremely saline places it does not compete well with *P. indica*, but where not actually washed by salt water it has established itself at the expense of the latter species. It may be seen especially abundantly at Kakaako, Honolulu, in vacant lots (Fosberg 27099). From Oahu it has spread to Johnston Island and Eniwetok Atoll, Marshall Islands.

Although established at Kapalama Heights on the campus of Kamehameha School it has not become common there. This, and the fact that it has been established on Nuuanu Pali and on the Waikane-Schofield Trail at the head of Kahana Valley for at least ten years without multiplying noticeably, suggest that, although it is capable of growing in very wet localities, it is not especially well adapted to them and cannot meet very successfully the competition of other introduced and native species. On bare cinders and ash on Punchbowl and Roundtop, however, it is spreading even in wet areas.

Verbesina encelioides Gray

In 1937 I saw this aromatic, yellow-flowered weed at Mokuleia and near Pearl Harbor. Degener in 1940 discussed its introduction and spread. Now it has become one of the commonest plants in open places, such as fields and roadsides, in the lowlands all over Oahu (Fosberg 27069, 27108). It even reaches considerable altitudes in the drier Waianae Mountains.

On Molokai it occurs in great abundance around the airport at Hoolehua in the low area between the two mountain masses (Fosberg 29541) and has spread from there to various near-by areas. A few individuals were seen on the south coast of East Molokai between Kamalo and Pukoo.

